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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/717,361 | 11/19/2003 | Rita Singh | MERL-1479 | 6699 |

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| EXAMINER | |
|---|---|
| LIEW, ALEX KOK SOON | |
| **ART UNIT** | **PAPER NUMBER** |
| 2624 | |

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
|---|---|---|
| 3 MONTHS | 04/02/2007 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/717,361 | SINGH ET AL. | |
| | Examiner | Art Unit | |
| | Alex Liew | 2624 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *19 November 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6 and 8-16* is/are rejected.

7)☒ Claim(s) *7* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Objections*

Claim 7 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The examiner cannot find likelihood projection of a vector X is an operation $L_N(X)$, resulting in an N-dimensional likelihood vector $Y_X$ and a component of the likelihood vector $Y_X$ is $Y_X = L_N(X) = [\log( P_X (X|C_1)) \log( P_X (X|C_2)) \ldots \log( P_X (X|C_N))]$ in combination with the rest of the limitations of claim 7 and claim 1.

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1 – 6, 8 – 10 and 13 – 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Watanabe (US pat no 5,754,681).

With regards to claim 1, Watanabe discloses a method for classifying data into multiple classes, the data in each class having a class-conditional probability distribution, comprising

- projecting the class-conditional probability distributions of measured data into a likelihood space (see col. 9 lines 5 – 8 – region $R^d$ represents the entire class space for all the classes, also it is likely that one of these classes are the correct class for signal patterns being examine, $p(x|C_s)$ of equation 8 is a conditional probability distribution and selects one of K classes) and
- classifying the projected class-conditional probability distributions in the likelihood space according to a discriminant classifier in likelihood space (see col. 11 lines 7 – 17 – equation 8 is to find the best class for a particular pattern using class-conditional probability distributions, $p(x|C_s)$, and is read as discriminant function, fig 3).

With regards to claim 2, Watanabe discloses a method of claim 1, in which the projecting is non-linear (see equation 6 – is a maximum likelihood estimator no a prior model involved, definition of non-linear projection is described by the applicant on paragraph 29).

With regards to claim 3, Watanabe discloses a method of claim 1, in which the data are discrete (see col. 9 lines 11 – 14).

With regards to claim 4, Watanabe discloses a method of claim 1, in which the data are continuous (see col. 9 lines 7 – 11).

With regards to claim 5, Watanabe discloses a method of claim 1, further comprising estimating the projected class-conditional probability distributions (see col. 11 lines 23 – 31).

With regards to claim 6, Watanabe discloses a method of claim 5, further comprising applying a likelihood maximization process to training data to obtain the estimated class-conditional probability distributions (see col. 11 lines 32 – 44 – equation 9 uses maximization process).

With regards to claim 8, Watanabe discloses a method of claim 1, in which the data represent a speech signal (see col. 9 lines 7 – 11).

With regards to claim 9, Watanabe discloses a method of claim 1, in which the data represent a visual signal (see col. 9 lines 11 – 14).

With regards to claim 10, Watanabe discloses a method of claim 1, in which the discriminant classifier is a linear discriminant with a unit slope (see col. 11 lines 56 – 57 – when one applies Gaussian models on to the equation 8 one will arrive at a result of a linear estimator with unit slope, because Gaussian is $Aexp(B(s-m)^2)$, where A and B are constants which relates to the variance, with a mean of m, when taking the first derivative to find the maximum index, the resulting estimator will be linear with unit slope).

With regards to claim 13, Watanabe discloses a method of claim 1, in which the classifier in the likelihood space is a distribution-based classifier (see equation 8 – is a classifier, which include probability distributions).

With regards to claim 14, Watanabe discloses a method of claim 1, in which the projecting distribution is a Gaussian function (see col. 11 lines 56 – 57).

With regards to claim 15, Watanabe discloses a method of claim 1, in which the projecting distribution is a mixture of Gaussian functions (see col. 11 lines 58 – 63).

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe ('681) as applied to claim 1 further in view of Kochert (US pat no 4,246,570). Watanabe discloses all of the claim elements / features as discussed above in rejection for claim 1 and incorporated herein by reference, but fails to disclose quadratic discriminant classifiers. Kochert discloses quadratic discriminant classifiers (see col. 9 lines 29 – 47). One skill in the art would use quadratic discriminant classifiers because

one may control the degree value of the polynomial function where it will improve efficiently and reduce expense (see col. 9 lines 48 – 54).

3. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe ('681) as applied to claim 1 further in view of Hammen (US pat no 6,532,305). Watanabe discloses all of the claim elements / features as discussed above in rejection for claim 1 and incorporated herein by reference, but fails to disclose logistic regression classifier. Hammen discloses logistic regression classifiers (see col. 4 lines 44 – 59). One skill in the art would include logistic regression classifiers because to make classification less complex by choosing the higher log value in the likelihood space.

4. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe ('681) as applied to claim 1 further in view of Casey (US pat no 2001/0044719). Watanabe discloses all of the claim elements / features as discussed above in rejection for claim 1 and incorporated herein by reference, but fails to disclose invertible projection. Casey discloses invertible projection (see paragraph 130 lines 4 – 11). One skill in the art would invert any projection because to reconstruct of the original vectors after the vector had been modified in the current space to make comparison between the two different spaces.

**Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alex Liew whose telephone number is (571)272-8623. The examiner can normally be reached on 9:30AM - 7:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Mancuso can be reached on (571)272-7695. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

**Alex Liew**
**AU2624**
**3/23/07**

JOSEPH MANCUSO
SUPERVISORY PATENT EXAMINER